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PLANETARY PHENOMENA FOR SEPTEMBER AND OCTOBER, 1915.

By Malcolm McNeill.

PHASES OF THE MOON, PACIFIC TIME.

Last Quarter. Sept.	1, $6^h 57^m$ A.M.	Last Quarter.. Oct.	1, $1^h 44^m$ A.M.
New Moon .. "	9, 2 53 A.M.	New Moon.... "	8, 1 42 P.M.
First Quarter. "	15, 11 21 P.M.	First Quarter.. "	15, 5 51 A.M.
Full Moon... "	23, 1 35 A.M.	Full Moon.... "	22, 4 15 P.M.
		Last Quarter.. "	30, 8 40 P.M.

The autumnal equinox, the time when the Sun crosses the equator from north to south, occurs September 23d shortly after 7 P. M.

Mercury passed superior conjunction with the Sun on August 14th, and is an evening star until it reaches inferior conjunction on October 22d. It reaches the greatest east elongation on the evening of September 27th. The apparent distance of the planet from the Sun at this time, 26° 2′, is rather larger than the usual greatest elongation distance; but the planet will not remain above the horizon as much as an hour after sunset thruout the two months period, and it is therefore not in good position for naked-eye view. This is what usually happens during the east elongations which come in the autumn. The planet moves along in a path, roughly speaking, the same as that of the Sun among the stars, and at the time of greatest east elongation will be at a point which the Sun will reach about a month later, except that on account of its being in the southern half of its orbit it will be 2° south of the normal Sun position. In all, it will on September 27th be more than 12° south of the Sun, and will remain above the horizon only three-fourths of an hour after sunset. After passing inferior conjunction on October 22d it becomes a morning star, moves rapidly away from the Sun and at the same time is some distance north of that body. By the end of October it rises nearly an hour and a half before sunrise and is an easy object in the morning twilight.

Venus passes superior conjunction with the Sun on September 12th and changes from morning to evening star. Thruout September its times of setting and rising are almost coincident with those of the Sun, and it will be out of reach of naked-eye view. By October 16th it has moved far enuf away from the Sun to remain above the horizon nearly half an hour after sunset, and this interval increases about ten minutes by the end of the month. Its great brightness, altho it is nearly at its minimum, will permit naked-eye view low down in the evening twilight in the latter part of the month; but the present two months, September and October, give the poorest opportunity of the year for views of *Venus*.

Mars is swinging around toward a better position for observation. On September 1st it rises about half an hour after midnight, and at the end of October a little more than half an hour before midnight. During the two months it moves about 36° eastward and 3° southward thru the constellations *Gemini* and *Cancer*. During the latter part of September it is in the neighborhood of *Castor* and *Pollux*, α and β *Geminorum*, and on September 25th passes about 6° south of *Pollux*, the southern and eastern one of the pair. On September 10th it passes conjunction with *Saturn* at a distance of 1° 8′ to the north, and on October 11th it passes 1° 28′ north of *Neptune*. Its distance from the Earth diminishes 39 millions of miles and its brightness increases 60 per cent during the two months, so that it is beginning to be quite a conspicuous object, altho only about one-fourth as bright as it will be when it comes to opposition in February next.

This is the best time of the year for seeing *Jupiter*, as it is above the horizon most of the night. It comes to opposition with the Sun on September 17th. On September 1st it rises a little more than an hour after sunset, on October 1st about an hour before sunset and at the end of October it remains above the horizon until about 2:30 A. M. It moves about 6° westward and 2° southward in the constellation *Pisces*.

Saturn on September 1st rises at about 1 A. M. and at the end of October shortly after 9 P. M. It is in the constellation

Gemini, south and west of *Castor* and *Pollux* and moves about 3° eastward during the month. The motion gradually diminishes until October 29th, when the planet becomes stationary and then begins its retrograde or westward motion. At that date it is 7° west and the same amount south of *Pollux,* the southern and eastern of the two stars. As seen in the telescope the rings are not quite as wide open as they were during the early part of the year, the minor axis being about 40 per cent of the major.

Uranus is in fairly good position for evening observation. It is well above the horizon at sunset and passes the meridian shortly after 10 P. M. on September 1st and shortly after 6 P. M. on October 31st. It is in the constellation *Capricorn* and its motion is slowly westward until October 22d, when it becomes stationary and then resumes its eastward course. No bright star is near it, but a fourth magnitude star, *θ Capricorni,* is quite close during early September. The planet will pass about 8′, one-quarter of the Moon's apparent diameter, south of the star on September 4th. It then moves away to the west of the star, but after the planet resumes its eastward motion it will pass the star again on December 27th.

Neptune remains in the constellation *Cancer,* too faint for naked-eye view.

PLANETARY PHENOMENA FOR NOVEMBER AND DECEMBER, 1915.

By Malcolm McNeill.

PHASES OF THE MOON, PACIFIC TIME.

New Moon...	Nov. 6,	$11^h\ 52^m$	P.M.	New Moon...	Dec. 6,	10^h	4^m	P.M.
First Quarter	" 13,	3	3 P.M.	First Quarter	" 13,	3	38	A.M.
Full Moon...	" 21,	9	36 A.M.	Full Moon...	" 21,	4	52	A.M.
Last Quarter.	" 29,	2	15 P.M.	Last Quarter.	" 29,	4	59	A.M.

The Sun reaches its most southerly point and winter begins December 22d about 3 P. M., Pacific Time.

Mercury is a morning star, having passed inferior conjunction on October 22d, and will remain a morning star until it